

VI. *On the Hydroptilidæ, a Family of the Trichoptera.*

By the REV. A. E. EATON, M.A.

[Read 3rd February, 1873.]

Trichoptera in general, but more especially the *Hydroptilidæ*, are an annoyance to the Lepidopterist. If he lives near a river they are a constant source of disappointment to him whenever, on a summer evening, he inspects the entomological miscellany which accumulates upon his tablecloth beneath the gaslight. Down falls a scorched and crippled "Micro—"; he has the trouble of looking at it; but his first glance detects the scabrous clothing of the anterior wings of a Micro-Trichopteron, whose hair looks as if it had been brushed the wrong way, in lieu of the scales of a Micro-Lepidopteron; and his only consolation is that *he* may leave the pinning of *that* kind of things to the Trichopterists.

A great similarity of ornamentation prevails amongst congeneric species of the *Hydroptilidæ*; and the density of their hair prevents structures of dried specimens from being made out with certainty, besides concealing the neuration of the wings completely. Consequently most entomologists have been deterred from the study of this family of insects, and little is known about them. Up to the present time only two genera have been defined, and fourteen or fifteen species. Of these one species is fossil, seven or eight are European, and the rest are from Madeira, North America, Ceylon and New Zealand. In addition to these I have been able to determine four genera and six species, of which species five are British.

Mr. Mc'Lachlan most kindly sent all of his specimens of *Hydroptilidæ* to me, with permission to subject them to most ruthless treatment. This has enabled me to effect some reductions in synonymy, and to verify some points in their geographical distribution. I have also examined Stephens' and Wollaston's collections in the British Museum.

The synonymy of species collated from foreign authors may be taken at what it may be worth. Without inspection of type-specimens it is impossible to arrive at decisions absolutely trustworthy respecting the species to which descriptions were intended to apply. All other identifications (since no figures of appendices have been published hitherto) are mere tentative conjectures more or less probable. Still, where they cannot be disproved, there is no reason why they should not be accepted. However, it is well not to attach much importance to them. At the least they may be regarded as indications of the occurrence abroad of species very nearly related to our native forms. Some of the British species have a wide range, being found even in Italy. It is possible, therefore, that Pictet's and Kolnati's species really occur in Great Britain. And, therefore, though unable to affirm this to be the case, I admit the identifications which have been set forth by previous workers in hope that they may be verified; but I do not give localities for species (without my having seen specimens from them) on the strength of these provisional identifications.

In Dr. Hagen's "*Phryganidarum Synopsis Synonymica*" a complete index to the literature published before the year 1864 relating to the family already exists. Up to that date I shall therefore give merely an enumeration of the authors with references to figures only. The places of descriptions may be ascertained from the subjoined list of publications. Since 1864, very little has been published about the *Hydroptilidæ*, and, in consequence, few additions require to be made to Dr. Hagen's index; such as there are I give in detail. There are some changes in the synonymy which I have adopted from Mr. McLachlan's "*Monograph of the British Trichoptera*;" for others I am myself responsible.

In the following list of publications the names originated by authors are given after the titles of the works in which they were first published:—

*A Chronological List of Publications relating to the
Hydroptilidæ.*

- 1819 (Dalm. Vet. Acad. Handl.) J. W. Dalman: in K. Vetenskaps Academiens Handlingar, i. 125—7, tab. vi. 1—4. *Hydroptila tincoides*.
 1823 (Dalm. An. Ent.) J. W. Dalman: *Analecta Entomologica*, pp. 26-7, tab. iii. 1—4. [Reprinted from his previous paper, with a few verbal alterations.]

- 1825 (Lat. Fam. Nat.) P. A. Latreille: Familles Naturelles du Règne Animal, p. 439.
- 1834 (Curt. Phil. Mag.) J. Curtis: Descriptions of some nondescript British Species of May-flies of Anglers: in Lond. and Edinb. Philos. Mag. ser. 3, pp. 217-8. *Agraylea sexmaculata, multipunctata. Hydropt. sparsa, veetis, costalis.*
- 1834 (Pict. Rech.) F. J. Pictet: Recherches pour servir à l'Histoire et à l'Anatomie des Phryganides, pp. 224-6, tab. i. 8 and xx. 10-13. *Hydropt. pulehricornis, flavicornis, brunneicornis.*
- 1836 (Steph. Ill.) J. F. Stephens: Illustrations of British Entomology, Mandibulata, vi. 151-4. *Hydroptilidæ.*
- 1839 (Burm. Handb.) H. C. C. Burmeister: Handbuch der Entomologie, Bd. ii. Abth. ii. pp. 905-6. *Hydropt. tincoodes* for *tineoides*.
- 1840 (Westw. Intr.) J. O. Westwood: Introduction to the Modern Classification of Insects, ii. 61, fig. 67, 11; Gen. Synop. p. 51. *Hydroptilides.*
- 1840 (Zet.) J. W. Zetterstedt: Insecta Lapponica, col. 1073-4. *Hydropt. pumilio, ambigua.*
- 1842 (Ramb.) J. P. Rambur: Histoire Naturelle des Insectes Névroptères, p. 499. [An abstract of Dalman's descriptions, not an exact translation.]
- 1845 (Schn.) W. G. Schneider: Verzeichniss der Von Herrn Zeller im Jahre 1844 in Sciellen und Italien gesammelten Neuropteren, &c.: in Stett. Ent. Zeit. vi. 346. *Hydropt. fuscicornis.*
- 1848 (Kol. Gen. et Sp. Trichopt. I.) F. A. Kolenati: Genera et Species Trichopterorum; pars prior, Heteropalpoideæ. Separate: ex Act. Reg. Bohem. Soc. Scient. pp. 22-3, 25-6, 34-5, 103-6; pl. iii. 28, a-d, -29. *Hydrolehestria argyricola. Hydropt. obscura.*
- 1848 (Blanch.) E. Blanchard: in Cuvier's Règ. Anim. ed. by Masson, Insectes, i. 112, tab. 106, bis f. 5.
- 1852 (Walk. Cat.) F. Walker: Catalogue of the Specimens of Neuropterous Insects in the Collection of the British Museum, Part I. pp. 131-5. *Hydropt. tenebrosa, (?) parva, Agraules.*
- 1854 (Hag.) H. A. Hagen: Ueber die Neuropteren der Bernstein Fauna: in Verh. Zool.-bot. Ver. Wien, iv. 107. *Hydrolest. succinea.*
- 1857 (Braun. Neur. Aust.) F. Brauer: Insecta Austriaca, Neuroptera, pp. 38-9.
- 1858 (Hag.) H. A. Hagen: Russlands Neuropteren: in Stett. Ent. Zeit. xix. 120.
- 1859 (Hag. Brit. Syn.) H. A. Hagen: Synopsis of the British Phryganidæ: in Entomologist's Annual, pp. 106-8. *A. sexpunctata* for *sexmaculata*, amongst synonyms at p. 106.
- 1859 (Hag. Syn. Ceyl.) H. A. Hagen: Synopsis der Neuroptera Ceylons: in Verh. Zool.-bot. Gesells. Wien, ix. 209. *Hydropt. cursitans.*
- 1859 (Kolen. Gen. & Sp. Trichopt. II.) F. A. Kolenati: Genera et Species Trichopterorum, pars altera, Æquipalpidæ: in Nov. Mem. Soc. Imp. Moscow, xi. pp. 160, 163, 181-2.
- 1860 (Mül. Terminol. Ent.) J. Müller: Terminologia Entomologica, fig. 483. [Reduced from Kolenati.]
- 1861 (Hag. Am. Syn.) H. A. Hagen: Synopsis of the Neuroptera of N. America: in Smithsonian Miscellaneous Collections, iv. 274-5. *Hydropt. albicornis, tarsalis.*

- 1862 (M'Lach.) R. M'Lachlan: Characters of new Species of Exotic Trichoptera: in Trans. Ent. Soc. Lond. ser. 3, i. 304. *Hydropt. albiceps*.
- 1863 (M'Lach.) R. M'Lachlan: Notes on North American Phryganidæ: in Entomologist's Annual, p. 158.
- 1864 (Hag.) H. A. Hagen: Phryganidarum Synopsis Synonymica: in Verh. Zool.-bot. Gesells. Wien, vol. xiv. 802, 824—6. Separate, pp. 4 and 26—8. [Under *Agraylea*, *Hydroptila* and *Hydrorhynchestia*.]
- 1865 (Hag.) H. A. Hagen: The Neuroptera of Madeira: in Entomologist's Monthly Magazine, ii. 77. *Hydropt. atra*.
- 1865 (M'Lach.) R. M'Lachlan: Trichoptera Britannica: in Trans. Ent. Soc. Lond. ser. 3, vol. v. 90—6, pl. i. 5; ii. 4, 31; v. 6, 7. *Hydropt. angustella*.
- 1865 (Hag.) H. A. Hagen: Die Phryganiden Maderas: in Stett. Ent. Zeit. xxvi. 219. *Hydrorh. insularis*.

In the present paper are described the following new genera and species:—*Phrixocoma forcipata*, *occulta*, *femoralis*; *Ithytrichia lamellaris*; *Orthotrichia*; *Oxyethira*; (*Agraylea*) *pallicornis*. The genus *Hydroptila* of Dalman is also re-established in its original and exclusive form. My types are (in fluid) in the British Museum and (pinned) in Mr. M'Lachlan's collection.

A Synonymic List of the Genera and Species of the Hydroptilidæ.

- Agraulæ*, Agassiz, 1846; [Kolen. 1848]; Walk. 1852 = *Agraylea*.
multipunctata, Walk. 1852 = *Agraylea multipunctata*.
sermaculata, ditto, ditto.
Agraylea, Curt. 1834; Steph. 1836; Westw. 1840; Hag. 1858, 1859; M'Lach. 1865: type *A. multipunctata*.
insularis, Hag.; in *Hydrorhynchestia*, Hag.
multipunctata, Curt. 1834; Ste. 1836; Hag. 1859; ! M'Lach. 1865, Trans. Ent. Soc. Lond. ser. 3, vol. v. 92, pl. v. 6 [neururation].
pallicornis! nov. sp.
pumilio, Zet.; in *Hydroptila*, Zet.; Hag. 1864;—incertæ sedis.
sermaculata, Curt. 1834; Steph. 1836; Hag. 1858 = *multipunctata*.
succinica, Hag.; in *Hydrorhynchestia*, Hag.
Hydroptila, Dalm. 1819, 1823; Lat. 1825; Ramb. 1842: type *H. tincoides*.
† *Hydroptila*, Curt. 1834; Pict. 1834; Steph. 1836; Burm. 1839; Westw. 1840; Zet. 1840; Schn. 1845; Kolen. 1848, 1859; Walk. 1852; Bran. 1857; Hag. 1858, 1859, 1861, 1864, 1865; Müll. 1860; M'Lach. 1862, 1863, 1865 = *Phrixocoma*, *Oxyethira*, *Orthotrichia*, &c.
albiceps! M'Lach. 1862 = *Oxyethira albiceps*.
albicornis, Hag. 1861 = *Phrixocoma albicornis*.
ambigua, Zet. 1840; Walk. 1852:—probably Lepidopterons, “alæ squamis.”

angustella ! M'Lach. 1865, Trans. Ent. Soc. Lond. ser. 3, vol. v. 95, pl. i. 5 = *Orthotrichia angustella*.

[*argyricola*, Dalm. MS. = *Agraylea multipunctata*.]

atra ! Hag. 1865, Ent. Mo. Mag. ii. 77 = *Orthotrichia atra*.

brunneicornis, Pict. 1834, tab. i. 8 and xx. 12; Kol. 1848, 1859; Walk. 1852 = *Ithytrichia lamellaris*? spurs 0, 3, 4.

† *brunneicornis* ! Steph. 1836 = *Phrixocoma sparsa*.

[*calocera*, Dalm. MS. = *Phrixocoma sparsa*.]

costalis, Curt. 1834; Steph. 1836; Walk. 1852; Hag. 1859; ! M'Lach. 1865, Trans. Ent. Soc. Lond. ser. 3, vol. v. 96 = *Oxyethira costalis*.

† *costalis*, Kol. 1859 = *Phrixocoma fuscicornis*.

cursitans, Hag. 1859:—incertæ sedis.

flavicornis, Pict. 1834, tab. xx. 11 = ? *Oxyethira costalis*. Spurs 0, 3, 4.

fuscicornis ! Schn. 1845; Walk. 1852 = ? *Phrixocoma fuscicornis*.

[*hirsutula*, Kollar, MS. = *Phrixocoma sparsa*.]

[*lanccolata*, Sundev. MS. Zet. 1840; Walk. 1852: not described.]

[*longula*, Dalm. MS. = *Agraylea multipunctata* ♀.]

obscura, Kol. 1848 = *Phrixocoma fuscicornis*.

parva ! Walk. 1852 = *Psychomyia parva*.

pulchricornis, Pict. 1834, tab. xx. 10; Kol. 1848, tab. iii. 29; Blanch. 1848, tab. 106 bis f. 5; Walk. 1852; Hag. 1858, 1859 = *Phrixocoma*.

pumilio, Zet. 1840; Walk. 1852:—incertæ sedis. Hagen refers it to *Agraylea*.

[*recurva*, Dalm. MS. = *Phrixocoma sparsa*.]

sparsa, Curt. 1834; ! Steph. 1836; Walk. 1852; Kol. 1859 = *Phrixocoma sparsa*.

tarsalis, Hag. 1861:—incertæ sedis. Spurs 0, 3, 4.

tenebrosa ! Walk. 1852; Hag. 1861; M'Lach. 1863, a genus of *Rhyacophilidæ* (not *Agapetus*).

tincoodes, Burm. 1839; Brau. 1857 = *Phrixocoma sparsa*.

tineoides, Dalm. 1819, tab. vi. 1—4 and 1823, tab. iii. 1—4; Ramb. 1842.

† *tineoides* ! Steph. 1836 = *Oxyethira costalis*.

† *tineoides*, Zet. (?) 1840; Kol. 1848, 1859; Walk. 1852; Hag. 1858, 1859; ! M'Lach. 1865, Trans. Ent. Soc. Lond. ser. 3, vol. v. 94, pl. v. 5 (neurion) = *Phrixocoma sparsa*.

Uctis, Curt. 1834; Steph. 1836; Walk. 1852; Hag. 1859 = præc.

Hydroptilidæ, Steph. 1836; Burm. 1839; Walk. 1852; Brau. 1857; Kolen. 1859; Hag. 1865; M'Lach. 1865.

Hydroptilides, Westw. 1840; Ramb. 1842; Hag. 1859 = præc.

Hydroptiloidæ, Agassiz, Nomencl. 1846: idem.

Hydrorchestria, Kolen. 1848 = *Agraylea*.

argyricola, Kol. 1848 = *A. multipunctata*.

insularis, Hag. 1865, Stett. Ent. Zeit. xxvi. 219 = *A. insularis*.

multipunctata, Kol. 1859 = *A. multipunctata*.

sexmaculata, Kol. 1848, tab. iii. 28, wing, palpus, 1859 = præc.

- succinica*, Hag. 1854 = *A. succinica*.
Ithytrichia, nov. gen.: type *I. lamellaris*.
lamellaris, nov. sp.
Orthotrichia, nov. gen.: type *O. angustella*.
angustella! M'Lach.: in *Hydroptila*, M'Lach.
atra! Hag.: in *Hydroptila*, Hag.
Oxyethira, nov. gen.: type *O. costalis*.
albiceps, M'Lach.: in *Hydroptila*, M'Lach.
costalis, Curt.: in *Hydroptila*, Curt.
Phrixocoma, nov. gen.: type *P. sparsa*.
albicornis, Hag.: in *Hydroptila*, Hag.
femoralis, nov. sp.
forcipata, nov. sp.
? *fuscicornis*! Schn.: in *Hydroptila*, Schn.
occulta, nov. sp.
pulchricornis, Pict.: in *Hydroptila*, Pict., ! Hag.
sparsa, Curt.: in *Hydroptila*, Curt.

Family HYDROPTILIDÆ.

Antennæ shorter than the wings, much shorter in the female than in the male; their basal joints not much stouter than the others. Ocelli present or absent. Maxillary palpi alike in both sexes, slender, sparsely hairy, five-jointed, but often apparently four-jointed owing to the obsolescence of the first joint. Labial palpi with the terminal joint enlarged. Tubercles of head and thorax with long coarse stiff hairs. Wings narrow, with very long fringes; the anterior with numerous erect or ascending hairs on the disk, and sometimes with an appendage near the base of the post-costa; the posterior with adpressed hairs on the disk, and without a fold. Legs slender, not very long; the posterior tibiæ more or less setose, sometimes pinnately hairy; the anterior tibiæ spurless, or with one spur; the intermediate with two or three, and the posterior with four spurs. Abdomen short: in the male there is usually a horny process from the ventral antepenultimate segment, the penis is long, and during life retracted; in the female the antepenultimate segment beneath has sometimes an indistinct prominence, the ovipositor during life is retracted and is furnished with two tentacles at the apex. I have not detected any sexual differences in the palpi, the venuration of the wings, or the tibial spurs.

The species with which I am acquainted appear to shun excessive heat. Prominent objects by the waterside, such

as tall plants and shrubs, palings and walls, present great attractions to them, and so does light. They retire to rest mostly amongst the grass and herbs, though crevices in bark and the uneven surface of shaded walls are frequent resorts of theirs during repose. Their vivacity is remarkable. As soon as they alight upon the ground they rush along helter-skelter with unusual impetuosity, flying off for a short flight from time to time whilst in full career, or coming to a dead stop to rest awhile with antennæ ascending and slightly separated (as suddenly as *Stenop-socus immaculatus* is in the habit of halting), and then starting off hurry-skurry once more. In deep repose some genera place their antennæ in a different posture to that which they assume in these short pauses. The species inhabit rivers and lakes. Their localities are sometimes confined to the neighbourhood of rapids in rivers.

The larva inhabits a portable case.

I am inclined to remove the *Hydroptilidæ* from the position usually assigned to them between the *Sericostomidæ* and the *Leptoceridæ*, and to place them beside the *Rhyacophilidæ*. The structure of the head and of the ovipositor, the horny ventral process of the antepenultimate segment of the male and its rudiment in the female of nearly all the genera, and the presence in some genera of an appendage to the anterior wing near the base of the post-costa, are the chief points in the imago which appear to indicate affinity between these two families.

But it may be objected to this view that the *Hydroptilidæ* are ranked with the *Inæquipalpidæ*, whereas the *Rhyacophilidæ* are amongst the *Æquipalpidæ*. So far, however, as I have been able to ascertain, the maxillary palpi of the male are five-jointed in the *Hydroptilidæ*, as Pictet stated. The fifth joint can be demonstrated with a Codrington lens without much difficulty in the male of *Agraylea*, and even in *Phrixocoma* under favourable circumstances. But if a $\frac{2}{3}$ object glass and a compound microscope be brought to bear upon specimens immersed in fluid, the palpus is seen to be obviously five-jointed in both sexes in all the genera, although in specimens freshly killed and viewed in air it may have seemed to consist of only four joints. And so the *Hydroptilidæ* being a family of the *Æquipalpidæ* this objection is disposed of; and I am not aware of any remaining to be raised against the proposal to rank them close beside the *Rhyacophilidæ*.

Since this was written I showed my figures to Mr.

McLachlan. When he saw a drawing of the maxillary palpus of *Phrixocoma sparsa* ♂, he remarked at once its likeness to the palpus of *Rhyacophila*.

Besides the mouth organs, the appendices of the male are seen with advantage in fluid.

For the investigation of their neuration it is necessary to denude the wings of their hair. This can be done without difficulty if the wing detached from the thorax be laid on a smooth sheet of paper and carefully brushed with a fine camel's hair pencil. The fringes may be left *in situ*, as they do not interfere with the view, and they are not easily removed.

An Analytic Table of the Genera of the Hydroptilidæ.

1	{	Ocelli present	..	..	..	..	..	..	2
	{	Ocelli absent	..	..	..	..	..	..	5
2	{	Spurs 1, 3, 4. Wings acuminate	..	..	..	..	..	<i>Hydroptila</i> .	
	{	Spurs 0, 3, 4	..	..	..	..	..	..	3
3	{	Anterior wings rather obtuse	..	..	..	..	..	<i>Agraylea</i>	
	{	Wings acuminate	..	..	..	..	..	..	4
4	{	Anterior inner edge with an appendage	..	..	..	..	..	<i>Ithytrichia</i>	
	{	Anterior inner edge entire	..	..	..	..	..	<i>Oxyethira</i>	
5	{	Spurs 0, 3, 4, wings acuminate	..	..	..	..	..	<i>Orthotrichia</i>	
	{	Spurs 0, 2, 4, wings acuminate	..	..	..	..	..	<i>Phrixocoma</i>	

Genus PHRIXOCOMA, nov. gen.

Neuration, Pl. II. 1—1 a : maxillary palpus, III. 1 b.

Hydroptila, Curt. 1834 ; nec Dalman.

Derivation.—(Gr.) *Phrigo-komes*, with bristling hair.

Imago. Antennæ in the male about half as long as the wings, in the female a quarter as long ; stout, moniliform, with coarse adpressed hair which gives to the joints a somewhat scutiform outline, the basal joint longer and thicker than the others ; in repose laid together horizontally, but during a halt in running slightly divergent and ascending. Head and prothorax with coarse shaggy hair. Ocelli absent. Maxillary palpi five-jointed, filiform, with moderate, short, spreading pubescence ; the first two joints very short, subequal ; the third and fourth joints long, subequal ; fifth joint rather the longest. Labial palpi filiform, with the apical joint as long as the other two together. Wings lanceolate, acute : the anterior scabrous, with very long fringes, in both sexes with a short appendage to the inner margin near the base whence a fold is produced for-

wards; the discoidal cell open, the anterior branch of the ramus discoidalis simple, the posterior forked with the anterior prong simple, the posterior prong forked; the superior branch of the ramus thyriifer forked, the anterior prong forked, the posterior prong simple; thus there are two adjacent apical forks. The posterior wing with adpressed hair and very long fringes, the costa shallowly concave in the second third, and with one transverse veinlet; the ramus discoidalis forked, the anterior prong simple, the posterior prong forked; the ramus subdiscoidalis forked with simple prongs; thus there is one apical fork. Legs of moderate length, the posterior tibiæ and the base of the posterior tarsus strongly fringed externally; anterior tibia spurless, intermediate with two spurs, the posterior with four. Abdomen with conspicuous appendices, which vary in number with the species; penis setiform, retracted during life, sometimes dilated at the tip; the horny process of the male antepenultimate segment is enclosed by long hairs from the segments.

I can add nothing at present to what has already been published concerning the larva and its case, living as I do in a neighbourhood unsuitable for their investigation.

The species affect rivers and lakes. They occur throughout Europe, from Sweden to Sicily, and from Ireland to Attica; also in Canada and Texas.

Phrixocoma sparsa.

Pl. II. 1. ♂ neuration, 1 b, ♀ genitalia; III. 1—1 a, ♂ genitalia, 1 b, maxillary palpus.

Hydroptila sparsa & *vectis*, Curt. 1834; *H. brunnei-cornis*, Ste. 1836 (nec Pict.); *H. tineodes*, Burm. 1839; *H. tineoides*, Zet. 1840 (nec Dalm.).

Head and prothorax satiny white, frons with some blackish hairs; palpi whitish; antennæ sometimes pale throughout, sometimes dark throughout, at other times with more or less of the terminal third alone dark, or with a pale ring beyond the middle. Anterior wings black, with glossy white markings, viz.: a large not sharply defined blotch near the base of the post-costa which does not reach the costa; an almost oblique fascia before the middle, which enters both fringes, and is enlarged most in the fringes of the inner margin; this is followed by a dot in the middle of the disk; this is succeeded by a pair of

opposite spots midway between the fascia and the apex of the wing, of which that in the costal fringes is the most conspicuous, and that on the terminal margin sparingly contributes to the fringes; after these is a straight fascia just before the extreme tip of the wing which enters the fringes; fringes purple black. Posterior wings black. Legs testaceous, or fawn colour, with glossy hair. Abdomen greenish, with closely adpressed, silvery-gray hair; the appendices inferiores of the male subulate divergent; the penis is exerted from a bulbous protuberance, and above it is extended a broad semi-campanulate membrane, which is emarginate in the middle; penis sheaths acicular.

Length with closed wings ♂ 4, ♀ 5 mm.

Hab.—England; in warm rivers. Abundant at Burton-on-Trent and Ringwood. June and July. The Netherlands.

I have stated above my doubts respecting the received synonymy, and my reasons for not abandoning it.

Phrixocoma pulchricornis.

Pl. III. fig. 2—2 b, genitalia ♂.

Hydroptila pulchricornis, Pict. 1834.

Head and prothorax with glossy yellowish-white hairs, frons with blackish hairs; palpi whitish; antennae sometimes black throughout, sometimes with the tip, a ring between the tip and the middle, and more or less of the base whitish. Anterior wings black, with glossy yellowish-white markings, which are more yellowish in the female than in the male, viz.: the base of the wing, a somewhat oblique fascia before the middle which is enlarged in both fringes, especially in those of the inner margin; this is followed by a dot in the middle of the disk; after this is a conspicuous pair of opposite spots which enter the fringes, that on the costa being triangular and the larger; these spots are succeeded by two short longitudinal rows of pale hairs on the disk; and these are followed by a straight fascia just before the extreme tip which sparingly contributes to both costal and terminal fringes; fringes with a purplish gloss. Posterior wings black, with purple-black fringes. Legs pale testaceous, with glossy hair, the femora rather darker. Abdomen greenish, with closely adpressed, glistening hair, the dorsal spots rather indistinct and more linear than usual. Appendices superiores with wide bases, compressed, blade-like, with their very acute points curved upwards, slightly diver-

gent; penis extruded from a large subconical protuberance, and hooked like a crochet needle; penis cover turned aside and curved downwards obliquely from near its flattened base, subulate with the extreme point slightly hooked.

Length with closed wings ♂ ♀ 3 mm.

Hab.—The lower pond in Battlesden Park, Bedfordshire. June. Königsburg.

Phrixocoma forcipata, nov. sp.

Pl. III. fig. 3—3 c, genitalia ♂.

Head and prothorax whitish-yellow (the colour of tow), frons with some blackish hairs; palpi brownish-white; antennæ black throughout, or with a broad white band beyond the middle before the tip, or in the female whitish with dark tips. Anterior wings black with glossy white markings, viz.: some faint longitudinal streaks near the base, an almost oblique fascia before the middle which enters both fringes, and is enlarged on the costa; this is followed by a faint dot in the middle of the disk; this is succeeded by a conspicuous pair of opposite spots, of which that on the costa is much the largest and brightest, and that on the inner margin contributes very little to the fringes; after these come the apical markings, consisting of the edging of the extreme tip at the insertion of the fringes which forms with two dashes in the fringes an ill-defined W, these dashes being not very regular; fringes with a purplish gloss. Posterior wings dark gray. Legs testaceous, with glossy hair. Abdomen green, the tips of the segments and the subpyriform dorsal spots darker; appendices inferiores connivent, slightly arcuate, flattened, with the acute points turned upwards, and with a few stiff black hairs pointed backwards on the outside; appendices superiores fang-shaped, with expanded bases, arcuate, with their acuminate points connivent downwards.

The female appears to want the faint dot after the fascia of the anterior wing.

Length with closed wings ♂ 3, ♀ 4 mm.

Hab.—Oakamoor, Staffordshire, and the River Dove, near Norbury and Ashbourne, Derbyshire. June. Mr. M'Lachlan has a specimen from Ireland; and also a series from Turin, which I think are of this species.

Phrixocoma occulta, nov. sp.

Pl. III. 4—4 b, genitalia ♂ dried.

Head and prothorax above with glossy whitish-yellow

hair, frons with some black hairs; palpi pale testaceous; antennæ dark, with a band beyond the middle, and a part of the basal third yellowish-white. Anterior wings black brown, with glossy white markings, viz.: a large indistinct patch on the inner margin at the base which does not reach the costa, but extends almost to the fascia; the fascia before the middle enters both of the fringes, forming a large spot in the costal fringe, and a smaller one in that of the inner margin; this is followed by a very indistinct dot in the middle of the disk, subtended by some scattered hairs which form a short dash on the margin just clear of the fringes; these are followed by the usual pair of opposite spots, of which the costal spot is the larger; and these in their turn are succeeded by a pair of small subequal opposite spots, which enter the fringes just before the apex. Posterior wings dark gray with dark fringes. Legs and their glossy hair testaceous. Abdomen discoloured in dried specimens; the upper anal fringes dark, the lower pale; appendices inferiores stout, lanceolate, obtuse, slightly divergent, and curved downwards, granulated; appendices superiores (or penis sheaths?) blade-like, long, linear, acute, and strongly-curved upwards; apex of penis straight.

Length with closed wings ♂ 3·5—4 mm.

Hab.—Mappleton, near Ashbourne, Derbyshire, between the bridge and the weir, occurring sparingly with *P. femoralis*, from which it is not at sight distinguished easily (whence the name). June.

Phrixocoma femoralis, nov. sp.

Pl. II. fig. 1 a, neuration ♀; III. 5—5 b, genitalia ♂.

Head and prothorax above with whitish-yellow hair, frons with black; palpi whitish; antennæ sometimes brown-black throughout, sometimes with their basal third pale, sometimes pale throughout, or with only a black band at the tip. Anterior wings black, with glossy yellowish-white markings, viz., a very indistinct patch at the base on the inner margin not reaching the costa, but extending half-way to the fascia; the usual fascia before the middle curved or subangulated, entering and enlarged in both fringes: this is followed by a faint dot in the middle of the disk; this is succeeded by a conspicuous pair of opposite spots, of which that on the costal fringes is larger than the one on the terminal fringes; after these comes an apical W, whose arms are in the fringes, and whose body borders the edge of the tip of the disk at the

insertion of the fringes ; in the female the arms of the W sometimes form detached spots, and the pale markings are less conspicuous than those of the other sex ; fringes with a purplish gloss ; posterior wings dark gray. Legs testaceous with glossy hair ; femora and anterior tibiæ black (whence the name). Abdomen greenish, almost olivaceous ; each segment with a pair of longitudinal dorsal lines, between which are a pair of pedunculated round spots, darker ; above the penis is a membranous trowel-shaped lobe ; and there are two long setiform processes for penis sheaths.

Length with closed wings ♂ and ♀ 3·5—4 mm.

Hab.—The Dove, at Mappleton, Derbyshire, between the bridge and the weir, in June. Also at Bellagio, Lago di Como, early in August.

(?) *Phrixocoma fuscicornis*.

Pl. II. 2, neuration ♂.

Hydroptila fuscicornis ! Schm. 1845 ; *H. ‡ costalis*, Kol. 1859, *obscura* idem 1848.

Head and prothorax silvery-white, frons with some blackish hairs ; palpi brown-black ; antennæ entirely brown-black. Anterior wings brown-black with silvery white markings, viz. : a conspicuous costal spot with a very ill-defined dash in the fringes of the inner margin opposite to it, in the place of the usual fascia, and another costal spot as large as the first between it and the apex of the wing, in the place of the usual pair of opposite spots. Posterior wings dark gray. Legs brown-black, the intermediate and posterior tibiæ and tarsi with a slight testaceous gloss. Abdomen not preserved well enough to afford figures of appendices being taken ; anal fringes dark ; penis exerted from a protuberance, setiform, thickened at the apex. Ventral process of the antepenultimate segment long, club-shaped.

Long. 2 mm.

Hab.—Near Messina ; middle of March. Case like yellow grains of rice. (Schn.)

I am doubtful whether this species belongs to *Phrixocoma*. The structure of the antennæ and the number of the spurs correspond ; but the neuration of the wings and their ornamentation is different.

*Phrixocoma albicornis.**Hydroptila albicornis*, Hag. 1861.

"Gray; antennæ stout, snow-white, with the middle and apex fuscous; palpi whitish; head with snow-white hair, the vertex with fuscous hair; thorax fuscous; feet whitish, the posterior ones ciliated with white; anterior wings grayish-fuscous, ciliated with gray, the margin and disk pointed with snow-white; posterior wings gray, clothed and ciliated with gray hair ♀."

"Length to tip of wings $3\frac{1}{2}$ millimetres, expanse 6 millimetres."

"*Hab.*—St. Lawrence River, Canada. (Osten Sacken)."
[After Hagen.]

Genus HYDROPTILA.

Hydroptila, Dalm. 1819: type, *H. tineoides*.

Imago. Antennæ short, stout, moniliform, with coarse adpressed hair which gives to the joints a shield-shaped form; some of the joints before the middle cylindrical; the basal joint rather longer and thicker than the others. Head and prothorax with long coarse hair. Ocelli present. Maxillary palpi filiform, with closely adpressed hair, five-jointed; the first two joints very short, subequal; the third and fourth oblong, equal to each other; the fifth joint not much longer than the fourth. Labial palpi with joints gradually increasing in length and thickness towards the tip, the terminal joint oblong. Wings linear lanceolate, acuminate, with very long fringes; the anterior scabrous, without an appendage to the postcosta; the posterior with adpressed hairs. Legs of moderate length, the intermediate and posterior tibiæ and the base of the posterior tarsus strongly fringed externally; anterior tibia with one apical spur, intermediate with one middle and two apical spurs, the posterior tibiæ with two spurs in the middle and two at the apex. Abdomen with conspicuous appendices in the male: penis setiform; ventral lobe of the antepenultimate segment perhaps wanting.

I caught one specimen, a male, on board a Rhine steamer off Johannisberg, in July. Having no opportunity for describing it, I placed it in fluid. This has prevented me from describing the neurulation and the form of the posterior wings.

Hydroptila tineoides.*Hydroptila tineoides*, Dal. 1819.

“Fusca capite, antennis, pedibusque pallidis; alis fuscis pilosulis, superioribus fasciis duabus punctoque apicali albis. [Tab. 111. (Act. Holm. 1819, i. p. 125)].”

“Habitat in monte Kinnekulle ad litora lacus Wenneri, passim frequens, supra undas volitans; [etiam Holmiæ].”

“Caput hirsutie crispata verticis alba, frontis nigra Ob hirsutiem verticis dijudicare nequeo, anne adsint ocelli nec ne. Antennæ pallidæ, nitidulæ, apice nigricante, articulis circiter 26 æqualibus. Thorax griseo-pilosus. Abdomen pallidum nitidulum. Pedes albicantes femoribus anticis infuscatis. Tibiæ anteriores apice calcaratæ, posticæ rectæ fimbriatæ ante apicem spinulis duabus, inferiore majore, armatæ, et in ipso apice spinulis duabus minoribus. Alæ anticæ fuscæ, fasciis duabus albis pilosis nitidulis æquali spatio remotis, exteriore sæpius interrupta; punctum {inter} illas in medio, et aliud in ipso apice ejusdem coloris. Signaturæ illæ tamen facile deteruntur. Alæ inferiores fusco-pilosulæ.”—Dalman.

Expanse of wings indicated in the plate.

Note.—The brackets [] enclose words added to the original description, whilst the brackets { } enclose words left out from it in the reprint in the “*Analecta Entomologica*.” The omissions comprise details concerning characters of generical significance.

Genus *ITHYTRICHIA*, nov. gen.

Neuration, Pl. II. 3.

Derivation.—(Gr.) *Ithu-thrix*, straight-haired as opposed to woolly.

Imago. Antennæ in the male half as long as the wings, filiform, clothed with adpressed hairs, which give to the joints a subscutiform appearance, the basal joint slightly larger than the rest. Head with long coarse hair. Ocelli present. Maxillary palpi filiform, with moderate slightly spreading hair, five-jointed; the first two joints very short, subequal, the next two of moderate length subequal, the fifth a little the longest. Labial palpi with the first joint very short, the second nearly as long as the third, the third subcylindrical, scarcely compressed. Prothorax with

dense shaggy hair. Wings linear lanceolate acute, with very long fringes; the anterior scabrous, with a short appendage to the post-costa near the base; discoidal cell open, the anterior branch of the ramus discoidalis simple, the posterior forked with the anterior prong simple, the posterior prong forked; the superior branch of the ramus thyriser forked, with the anterior prong forked, the posterior prong simple; thus there is one fork before and behind the apex; the posterior wings with adpressed hair, the costa shallowly concave just before the middle, and one transverse veinlet; the ramus discoidalis forked with the anterior prong simple, the posterior prong forked; the ramus subdiscoidalis forked with simple prongs; thus there is one fork before the apex. Legs of moderate length, the posterior tibiæ pinnately fringed; anterior tibiæ spurless, the intermediate with three, the posterior with four spurs. Abdomen with short stout appendices, the ventral process of the antepenultimate segment slender, penis concealed.

The only English species known is found in running water. Mr. McLachlan's collection contains a species from Hungary.

Ithytrichia lamellaris, nov. sp.

Pl. II. 3, neuration ♂; III. 6—6 b, genitalia ♂.

? *H. brunneicornis*, Pict. 1834.

Head and prothorax with tow-coloured hair, frons with blackish hair; palpi smoky white; antennæ whitish-yellow, the last seven or eight joints blackish. Anterior wings black with yellowish-white markings, viz.: some longitudinal streaks near the base; an irregular angulated fascia before the middle which is enlarged in the fringes of the inner margin; this is followed by a dot in the middle of the disk; this is succeeded by a conspicuous pair of opposite spots, of which the costal spot is the larger and is followed by one or two irregular and indistinct dots on the edge of the disk and on the longitudinal nervures; these are succeeded by the edging of the extreme tip of the disk; fringes black with a purplish gloss; posterior wings black or dark gray. Legs testaceous with glossy hair, the femora darker. Abdomen blackish; appendices superiores stout, flattened, with the points turned in like a hooked claw; during life when viewed in air they appear to be a membranous lobe above the penis (hence the name).

Female very similar, but with the markings of the wings less distinct.

Length with closed wings ♂ ♀ 4 mm.

Hab.—The Sandy Brook, near Hanging Bridge, Ashbourne, Derbyshire. June. Does *Hydroptila brunneicornis*, Pict. belong here? The colour of the antennæ is similar, and the number of spurs is stated to be 0, 3, 4, by Dr. Hagen in a letter from him to Mr. M'Lachlan, he having examined types.

Genus ORTHOTRICHIA, nov. gen.

Neuration, Pl. II. 4 ♂, 4 a ♀.

Hydroptila (part), M'Lachlan, 1865.

Derivation.—(Gr.) *Ortho-thrix*, with hair upstanding or on end.

Imago. Antennæ of the male about three-quarters as long as the wings, filiform, the joints subcylindrical with closely adpressed hairs, the basal joint rather larger than the others: in repose divergent and ascending. Ocelli absent. Maxillary palpi filiform, with moderate slightly spreading hair, five-jointed; the first two joints very short, equal; the next two joints subequal to one another; the fifth joint a little the longest. Labial palpi filiform, with the joints successively increasing slightly in length. Head and prothorax with dense shaggy hair. Wings linear lanceolate, acuminate, with very long fringes; the anterior scabrous, without an appendage to the post-costa, discoidal cell open, the ramus discoidalis forked, with both prongs forked; the superior branch of the ramus thyriifer forked, the anterior prong forked, the posterior prong simple; thus there are two forks before the apex and one behind it; the posterior wings with adpressed hair, the costa shallowly concave in its second third, and with one transverse veinlet; the ramus discoidalis forked, with the anterior prong simple, the posterior prong forked; the ramus subdiscoidalis forked with simple prongs; thus there is one fork before the apex. Legs of moderate length, the posterior tibiæ and the base of the tarsus strongly fringed externally; anterior tibia spurless, intermediate with three, posterior with four spurs. Abdomen with small appendices and setiform penis, the antepenultimate segment in the male with a slender ventral lobe; after death the penis is usually extruded.

The species inhabit warm rivers and lakes in England,

Königsburg (sp. dub. Hag. letter to M'Lach.), Italy and Madeira; also The Netherlands.

Orthotrichia angustella.

Pl. II. 4—4 a, neurulation ♂ ♀; III. 7—7 c, genitalia ♂.

Hydroptila angustella, M'Lachlan, 1865.

Head and prothorax with whitish or tow-coloured hair; palpi very pale testaceous; antennæ pale fawn-colour, sometimes with a very narrow whitish ring just before the tip, at other times with three black rings separated by whitish spaces, one ring near the tip, the others between it and the middle. Anterior wings black, with glossy pale tow-coloured markings, viz.: ♂, the inner margin, an indistinct fascia before the middle, which is preceded by some faint streaks along the disk; after this is a large costal spot subtended by an oblique longitudinal streak on the disk which enters the terminal fringe and is itself subtended by another shorter streak which reaches but does not enter the fringe; after this come two pairs of opposite spots in the fringes, sometimes more or less confluent across the disk; and last of all the extreme tip of the wing; in the ♀ the discal markings are very indistinct or absent, the fringes (especially where the costal blotch should be) and the indistinct fascia only are conspicuously pale. Posterior wings gray. Legs very pale testaceous with glossy hair. Abdomen green, with pale joinings, the bases of the segments darker, each segment with a dorsal pair of dark subquadrate or oval blotches; the appendices inferiores slightly ascending, triangular, flat, and incurved; penis exerted from an oval hump adpressed to one side of which is an acute blade-like process curved upwards; there is a setiform sheath, and the apex of the penis is thickened and incised; in the female there is a slight apical projection beneath the penultimate segment.

Length with closed wings ♂ 3.—3.5, ♀ 4.5 mm.

Hab.—Standing water and slow streams in the south of England; common at Ringwood along the bridges. May, June, July. Bellagio, Lago di Como, August. The Netherlands.

Orthotrichia atra.

Hydroptila atra, Hag. 1865.

“Capite et thorace atris; antennis unicoloribus atrofuscis; alis brunneis, fusco-pilosis, griseo-fimbriatis; pedibus fuscis, tibiis posticis griseo-fimbriatis.”

“Long. cum alis 2½ mill.; exp. alar. 5 mill.”

"The head slightly inflated, with two rounded tubercles close to the occiput. Antennæ slightly more distant than is usual in the species of this genus, stout, as long as the body. Wings very narrow, pointed. Legs rather strong, the posterior pair long. The colour is wholly of a uniform, rather dark, blackish-brown; the wings brownish, with brown pubescence, and with long grayish-brown fringes; the feet dark brown, with grayish hairs on the posterior thighs. (The individual has lost its abdomen, but is otherwise in good condition.)"

"Madeira." [After Hagen.]

The specimen is now in rather worse condition. Besides the abdomen, it has lost its head, one antenna, and both of its intermediate legs. The joints of the antennæ are rather longer than is usual. The wings are as broad as those of a *Phrixocoma*; the inner margin of the anterior wing appears to be destitute of an appendage, and, according to Dr. Hagen, the ocelli are wanting. A figure of the neurulation of the wings sent by him in a letter to Mr. M'Lachlan (from which I obtained information of the want of ocelli), exhibits conformity to the neurulation of *Orthotrichia angustella*, excepting in the presence of a cross-veinlet in the middle of the anterior wing. I am inclined to consider this only a point of secondary importance, having met with a similar specific difference of neurulation in the genus *Ithytrichia*. Therefore I have no doubt that *H. atra* is referrible to *Orthotrichia*, because the absence of ocelli, the form of the antennæ and anterior wings, and the neurulation of the wings, do not admit of its being otherwise disposed of.

Dr. Hagen, in his letter above alluded to, states that a Madeiran species of *Hydroptilidæ* with ocelli was formerly present in Mr. Wollaston's collection. The only specimen was of small size, and was lost by an accident in the course of working.

Mr. M'Lachlan possesses another specimen of an undescribed *Orthotrichia* from the same island. Being unable to figure the appendices I do not describe it.

Genus OXYETHIRA, nov. gen.

Neurulation, Pl. II. 5; 5a, posterior wing.

Derivation.—(Gr.) *Oxu-etheiros*, with sharp-pointed hair.

Imago. Antennæ in the male half as long as the wings,

submoniliform, with sparse closely adpressed hair which gives to the joints a subscutiform outline; the basal joint rather larger than the others; in repose they are approximated to each other and ascending. Head and prothorax with dense shaggy hair. Ocelli present. Maxillary palpi filiform, with moderate slightly spreading hair, five-jointed; the first two joints very minute, subequal; the third slightly shorter than the fourth; the fifth slightly the longest. Labial palpi with the first joint very short, the second not so long as the third, which is oblong-ovate and slightly compressed. Wings linear lanceolate, acuminate, with very long fringes; the anterior scabrous, without an appendage to the inner margin, the discoidal cell open; the anterior branch of the ramus discoidalis simple, the posterior branch forked with simple prongs: the superior branch of the ramus thyriifer forked with simple prongs; thus there is a primary fork before and behind the apex; the posterior wings with the costa肘ed near the base, and with adpressed hair; the ramus discoidalis simple; the ramus subdiscoidalis forked with simple prongs; thus there is one primary fork behind the apex; no transverse veinlet. Legs of moderate length, the posterior with the tibia and the base of the tarsus strongly fringed externally; anterior tibia spurless, intermediate with three spurs, the posterior with four. Abdomen with small appendices and setiform penis; the horny ventral lobe of the antepenultimate segment in the male very short.

The English species occurs in ponds. The genus is represented in Great Britain, France, Germany (perhaps Switzerland), Turkestan and New Zealand. The Turkestan and another species of doubtful locality are at present undescribed, and are in Mr. M'Lachlan's collection; the former being on loan from the Moscow Museum.

Oxyethira costalis.

Pl. II. 5, neurulation ♂; 5 a, posterior wing; III. 8—8 a, genitalia ♂.

Hydroptila costalis, Curt. 1834; *H. tincoides*, Steph. 1836; ? *H. flavicornis*, Pict. 1834.

Head and prothorax whitish-yellow (the colour of tow), frons with some blackish hairs; palpi smoky white; antennæ pale fawn-colour throughout, sometimes with an indistinct narrow ring before the tip dusky. Anterior wings black, with glossy, tow-coloured markings, viz.: a

slender fascia before the middle which expands in both fringes and is preceded by some indistinct clouds on the disk; this is followed by a large triangular blotch extending from the costal fringes almost across the wing and subtended by a pale dash in the terminal fringes; this is followed by a small spot on the costa subtended by a larger one on the terminal margin, both entering the fringes; after these come the extreme tip, and a small spot just before it in the terminal fringes; posterior wings gray, with concolorous fringes. Legs testaceous, with glossy hair. Abdomen pale greenish, with two dorsal rows of pedunculated black spots; appendices superiores stout, claw-shaped, with the points turned inwards; two little tubercles on each side of the penis may represent sheaths.

In the female the basal clouds on the anterior wing are less distinct; the fascia is interrupted; and an oblong blotch on the costa subtended by a spot on the disk, takes the place of the triangular blotch. Antennæ a quarter as long as the wings.

Length with closed wings ♂ 3—3.5, ♀ 4 mm.

Hab.—Ponds in Woburn and Battlesden Parks, Bedfordshire, which are infested with *Polygonum amphibium*. May, June, July. It occurs also in Scotland, and the Département de l'Aube, near Bar-sur-Seine (M'Lachlan's collection); also at the end of May at Königsburg (Hag. in letter to M'Lach.), and in Brabant.

Oxyethira albiceps.

Hydroptila albiceps, M'Lach. 1862.

Head and prothorax whitish-yellow, frons with some blackish hairs; palpi grayish-testaceous; antennæ pale testaceous, with the tip dark gray; anterior wings grayish-fuscous; the inner margin towards the base, and a very indistinct fascia before the middle which expands in the fringes of the inner margin and is extended along it for a little distance as a narrow streak which lies partly in the fringes and partly in the contiguous portion of the disk where it is interrupted by a dark spot on the longitudinal fold, paler; there are also a pair of opposite spots and some discal streaks in the terminal region of the wing, and also a transverse blotch forming a fascia immediately before the dark apex of the wing, paler. Posterior wings

pale gray. Anterior legs gray, with pale joinings to the tarsi; posterior legs testaceous. Abdomen (wanting in Mr. M'Lachlan's specimen "brown above, silvery beneath."

Long. ♂ 2 mm.

Hab.—New Zealand.

Mr. M'Lachlan thinks that the dark extreme apex of the anterior wing was wanting in the type; hence the discrepancy between my description and his.

Genus AGRAYLEA.

Neuration, Pl. II. 6.

Agraylea, Curt. 1834; *Hydroptila* (part), Zet. 1840; *Hydrorchestria*, Kolen. 1848; *Agraules*, Walk. 1852.

Imago. Antennæ of the male about three-quarters as long as the wings, in the female about half as long, filiform; the joints loosely articulated, with adpressed hair, the basal joint rather the largest; in repose divergent and ascending. Head and prothorax with long, coarse, shaggy hair; ocelli present; maxillary palpi five-jointed, filiform, with sparse spreading pubescence; the first two joints very short, subequal, the next two subequal and of moderate length, the fifth joint rather the longest. Labial palpi with the apical joint a little longer than the first two joints, and hardly at all broader than thick. Anterior wings subtrapezoid or narrowly oblong, with a small appendage to the inner edge near the base, the apex rather obtuse, the disk scabrous, long fringes, and the discoidal cell open; the anterior branch of the ramus discoidalis forked near its origin, with simple prongs, the posterior branch forked near its middle, with simple prongs; the superior branch of the ramus thyrisifer forked, with the anterior prong forked, the posterior prong simple; thus there are two forks before the apex and one behind. Posterior wings ovato-lanceolate acute, the costa entire, hair adpressed, fringes very long, no transverse veinlet; the ramus discoidalis forked, with the anterior prong simple, the posterior prong forked; the ramus subdiscoidalis forked, with the anterior prong forked, the posterior prong simple; thus there is a fork on either side of the apex. Legs of moderate length, the posterior tibia with sparse short hair, not fringed; anterior tibia spurless, the intermediate with three spurs, the posterior with four. Abdomen with stout short appendices and setiform penis, which is concealed

during life; the horny lobe from the antepenultimate segment beneath is rather long.

Species occur throughout Europe and in Turkestan. The Turkestan species in Mr. M'Lachlan's possession, sent from the Moscow Museum, is undescribed.

Agraylea multipunctata.

Pl. II. 6, neurulation; III. 9—9 a, genitalia ♂.

Agraylea multipunctata and *sexmaculata*, Curt. 1834; *Hydrorchestria argyricola?* *multipunctata* and *sexmaculata*, Kolen. 1848; *Agraulis multipunctata* and *sexmaculata*, Walk. 1852.

Head and prothorax with pale yellowish-gray hair; palpi pale; antennæ black. Anterior wings usually with pale-yellowish markings; these are sometimes,—on the inner margin a long space near the base followed by two shorter ones, of which one is near the middle, the other near the arculus, very conspicuous; on the terminal margin two or three small spots, the first two of which enter the fringes; on the costal margin a conspicuous blotch at the pterostigmatic region, followed by two minute spots towards the tip; the disk has many spots, often there are three larger than the rest in the middle of the post-median portion of the wing. Posterior wings unicolourous gray, their fringes with a faint purplish gloss. Legs greenish-gray or subolivaceous, or sometimes testaceous with blackish femora, with pale testaceous hair. Abdomen greenish; appendices superiores finger-like, the tips slightly expanded, curved downwards; appendices inferiores distant, curved upwards, also finger-like; penis with the tip expanded; ventral process of the antepenultimate segment flattened, the apex truncate, slightly expanded and just turned down, the base with a small, projecting, triangular tooth.

Long. ♂ ♀ 4—5 mm.

Hab.—England, in lakes and slow rivers; common at Ringwood. June, July, August. Sweden (M'Lachlan's collection). Kolenati's *A. argyricola* is possibly a distinct species. I have never seen *A. multipunctata* with a pale band before the tip of the antennæ, nor with whitish hair upon the head and prothorax. Tourists in southern Sweden (Stockholm, Dalecarlia) should look out for this form, to determine whether it is a variety only of *A. mul-*

tipunctata, which itself occurs in that country coloured as it is in England. Mr. M'Lachlan has a specimen with wings uniformly black, taken in England.

Agraylea pallicornis, nov. sp.

Pl. III. 10—10 a, genitalia ♂.

Head and prothorax with pale-yellowish hair, the occipital tufts blackish; palpi pale; antennæ pale testaceous throughout. Anterior wings brown-black, closely spotted with yellowish, with an interrupted streak along the inner margin, and three of the spots along the costa slightly larger than the others, not very conspicuous. Posterior wings unicolorous gray. Legs testaceous, with like coloured hair. Abdomen faded in dried specimens; penis sheath ascending, forked, the upper prong the longest and slightly curved inward; penis slightly thickened at the tip; appendices (?) inferiores large, triangular, concave; ventral process of the antepenultimate segment long, slender, ascending, with the tip curved downwards.

Long. ♂ 5—5.5 mm.

Hab.—Turin (Chiliani). From 4 ♂ in Mr. M'Lachlan's collection.

Agraylea insularis.

Hydrorchestia insularis, Hag. 1865.

"Dull coal black. Wings brown, with the membrane somewhat shining."

"The size of *Orthotrichia atra*."

Hab.—Madeira (Hag.).

SPECIES GENERIS INCERTI.

Hydroptila cursitans, Hag. 1859.

"Tota nigerrima; alis valde angustis, acutissimis, nigro-ciliatis; tarsi postici pallidis."

"Long. 2 mm."

"*Hab.*—Rainbodde, vulgaris" (Hag.).

Hydroptila tarsalis, Hag. 1861.

"Gray; antennæ somewhat robust, rather long, fuscous with gray hair; palpi black, the apex snow-white; head black, the vertex white; thorax fuscous; feet whitish, anterior tibiæ, spurs, and tarsi fuscous, the latter annulated with white" [spurs 0, 3, 4]; "posterior feet with gray cilia; anterior wings fuscous, the anterior margin black,

ciliated with gray, and pointed with snow-white; posterior wings with gray hairs and cilia. Male."

"Length to tip of wing 3 mm.; expansion $5\frac{1}{2}$ mm."

"*Hab.*—St. Lawrence River, Canada (Osten Sacken). Is this the sex of the preceding species?" [After Hagen.]

[The "preceding species" is *Phrixocoma albicornis*, Hag., and therefore the question may be answered in the negative, the difference in the spurring of the legs precluding their identity. When Dr. Hagen wrote, it was not known that both sexes throughout a genus of the *Hydroptilidæ* have the spurs alike in number, specimens with 0, 2, 4 spurs being hitherto considered to be the males of specimens with 0, 3, 4 spurs if both were caught in the same locality.]

Hydroptila pumilio, Zet. 1840.

"Tota fusca, pedibus flavo-testaceis; alis omnibus cinereis subpubescentibus, margine distincte ciliatis, superioribus nervorum longitudinalium duobus versus marginem interiorum breviter furcatis. ♂ long. $\frac{3}{4}$ exp. vix 2 lin."

"*Habitat* in Lapponia Umensi, ad Lycksele et Åsele 26 Jul.—17 Aug."

"♂ Antennæ longitudo corporis fuscae vix annulatæ sed basi paullo dilutiores. Alarum furcæ apicales ad marginem anteriorem duæ, ramis brevibus furcatæ. Tibiæ posticæ perspicue ciliatæ." [After Zetterstedt.]

[Dr. Hagen, in his "Phryganidarum Synopsis Synonymica," refers this species to the genus *Agraylea*. I am inclined, however, to suspect it may be related to *Phrixocoma*. The small size of the insect, and the remarked shortness of the apical forks, seem to exclude it from the first mentioned genus, though the number of forks stated by Zetterstedt prevents its being classed with *Phrixocoma*.]

Geographical Distribution of Species.

<i>Phrixocoma sparsa</i> , p. 133	..	..	..	..	..	England
„ <i>pulchricornis</i> , p. 134	..	..	..	..	..	England and Prussia
„ <i>forcipata</i> , p. 135	..	..	..	..	..	Ireland, England and Italy
„ <i>occulta</i> , p. 135	..	..	..	..	..	England
„ <i>femoralis</i> , p. 136	..	..	..	..	..	England and Italy
? „ <i>fuscicornis</i> , p. 137	..	..	..	..	..	Sicily
„ <i>albicornis</i> , p. 138	..	..	..	..	..	The St. Lawrence
<i>Hydroptila tineoides</i> , p. 139	..	..	..	..	..	Sweden
„ <i>sp.</i> —, p. 138	..	..	..	..	..	The Rhine
<i>Itthytrichia lamellaris</i> , p. 140	..	..	..	..	..	England
„ <i>sp.</i> —, p. 140	..	..	..	..	..	Hungary
<i>Orthotrichia angustella</i> , p. 242	..	..	..	..	..	England, Italy and ? Prussia
„ <i>atra</i> , p. 142	..	..	..	..	..	Madeira
„ <i>sp.</i> —, p. 143	..	..	..	..	..	„
<i>Oxyethira costalis</i> , p. 144	..	..	..	..	..	Scotland to France & England to Prussia
„ <i>albiceps</i> , p. 145	..	..	..	..	..	New Zealand
<i>Agraylea multipunctata</i> , p. 147	..	..	..	..	..	England and Sweden
„ <i>pallicornis</i> , p. 148 [*]	Italy
„ <i>insularis</i> , p. 148	..	..	..	..	..	Madeira
„ [<i>succinica</i>], p. 127	..	..	..	..	..	Fossil in amber
<i>Gen.</i> — <i>cursitans</i> , p. 148	..	..	..	..	..	Ceylon
„ <i>tarsalis</i> , p. 148	..	..	..	..	..	The St. Lawrence
„ <i>pumilio</i> , p. 149	..	..	..	..	..	Lapland

EXPLANATION OF THE PLATES.

Pl. II. The wings pointing to the right are from ♂ subjects; those pointing to the left are from ♀ subjects.

- Fig. 1. *Phrixocoma sparsa* ♂ wings.
 1a. " *femoralis* ♀ "
 1b. " *sparsa* " apex of abdomen beneath with ovipositor extruded.
 2. " *fuscicornis* ♂ wings.
 3. *Ithytrichia lamellaris* " "
 4. *Orthotrichia angustella* " "
 4a. " " ♀ anterior wing.
 5. *Oxyethira costalis* ♂ wings.
 5a. " " clothing of posterior wing: hairs on the costal margin disposed so as to fit into the fold of the anterior wing as in some of the preceding genera, and in *Mystacides* as is mentioned by M'Lachlan.
 6. *Agraylea multipunctata* ♂ wings.

Pl. III. The figures are from freshly killed specimens where the contrary is not affirmed.

- Fig. 1. *Phrixocoma sparsa* ♂ genitalia beneath
 1a. " " " " sideways.
 1b. " " " " maxillary palpus.
 2. " *pulehricornis* " " genitalia sideways.
 2a. " " " " " "
 2b. " " " " " " (dried).
 3. " *forcipata* " " beneath.
 3a. " " " " inf. append., sideways.
 3b. " " " " idem, with appendix superior, obliquely beneath.
 3c. " " " " sup. append. with penis, above.
 4. " *occulta* " " genitalia sideways (dried).
 4a. " " " " beneath (dried).
 4b. " " " " behind (dried).
 5. " *femoralis* " " sideways.
 5a. " " " " projection seen from above.
 5b. " " " " " " beneath.
 6. *Ithytrichia lamellaris* " " apex of abdomen sideways.
 6a. " " " " appendices above.
 6b. " " " " " " beneath.
 7. *Orthotrichia angustella* " " genitalia sideways from the left.
 7a. " " " " " " above.
 7b. " " " " " " beneath.
 7c. " " " " " " sideways from the right.
 8. *Oxyethira costalis* " " sideways.
 8a. " " " " beneath.
 9. *Agraylea multipunctata* " " sideways.
 9a. " " " " " " beneath.
 10. " *pallicornis* " " sideways (dried).
 10a. " " " " " " (dried).

